THE RELATION

OF

MODERN ENGINEERING

TO

PUBLIC HEALTH AND LOCAL GOVERNMENT.

READ AT OXFORD, BEFORE A

MEETING OF MUNICIPAL AND SANITARY ENGINEERS AND SURVEYORS,

FEB. 18, 1876,

BY

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OXFORD and LONDON:
JAMES PARKER AND CO.
1876.
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PRINTED AT THE
OXFORD

From the Author.

THE RELATION OF MODERN ENGINEERING TO PUBLIC HEALTH AND LOCAL GOVERNMENT.

THERE is no chapter in human history more interesting and instructive than that which tells of the progress of the Art and Science of Engineering. When that whole history is hereafter written, it is not rash to say that, British engineers will stand out pre-eminent. Though Indian work may rival theirs in beauty, Italian in grace, Egyptian in solidity, Roman in municipal service, they will in the combination of their qualities be found to have been equalled by none. And yet, how short is the period in which British workmen have earned this fame. Some still living can remember when the lighthouse on the Eddystone was a novelty. I travelled, as a boy, on the first steam-worked passenger railway shortly after Huskisson's death. Many now living saw the first telegraph wire stretched along the Western line. Steam applied to the largest men-of-war is but a recent affair. Ironclads were begun only the other day. A full appreciation, by the masses, of Sanitary Engineering, even if it exist now, is not of five years' duration. Three years ago, a well-known speaker thought on a public occasion to gain a cheer by seeking to cast ridicule on those who prefer, like you, to prevent preventable disease, rather than only to cope with it

unprevented. A like course would not be attempted now. Considering, then, the infancy of knowledge and of public opinion on this matter, it is not strange that the place of the Sanitary Engineer is not yet precisely defined.

In the Public Health Act of 1875, the summary of all health enactments, the name of Engineer does not once occur in the 343 clauses. He is still the old "Surveyor" we all remember, the plodding, energetic man of highways and byways, whose Anglo-Saxon vigour broke forth from the garb of corduroy, from the measuring-tape and links, into the transcendent skill of Macadam; and whose followers take rank with men of courage, and knowledge, and power, such as Brindley, Smeaton, Rennie, and Stephenson.

In considering the Consolidated Public Health Act, it is strange to see how the higher place of an Engineer is, by implication, conceded to him. Every urban authority may be "Surveyor of Highways," § 144; shall appoint "a fit and proper person to be Surveyor," § 189; and, "the same person may be Surveyor and Inspector of Nuisances," § 192. But then, the Surveyor of the present day may be called to advise on anything, from the form and cost of an earthen syphon-trap, to the calculation for work to be done by engines, which are to supply half-a-million of persons with water, safe to be sipped in wine-glasses, and delivered in quantities adequate to cleanse the foulest and largest of factories; to be responsible for the construction of sanitary mechanisms, from a housemaid's sink to an "intermittent downward filtration" farm. If required to

act also as Inspector of Nuisances, he is to have knowledge of what is dangerous to the public weal in respect of any and all nuisances; of all filth-producing agencies; of soundness and unsoundness of food; of occasions of epidemics and contagions. He is to be able to carry out all measures for prevention of infectious diseases advised by the medical authority: he is faithfully to observe and execute all lawful orders of the Local Government Board which may be hereafter issued.

Such is the modern Civil Engineer, when attached, for purposes of local government, to a sanitary authority, urban or rural.

I should not presume to speak on so wide a topic, but that my attention has been drawn to it from boyhood. While still a student at the University, I was much impressed by examining the gigantic arrangements for supplying ancient Rome with water, and by traversing along its whole length the splendid Aqueduct on the north coast of Africa, which, taking its rise on the hills of Zagouhan, supplied a vast stream to Udina and to Carthage. I venture to shew you various sketches illustrating this great work, made on the spot nearly forty years ago. Your attention should be drawn to the sketch in which the source of the stream in the side of the mount is shewn. It is remarkable that round this a spacious and solid edifice was raised, shewing with what religious care the source of the water-supply was protected from contamination. Not long after, during a residence of some weeks in Holland, the skill and engineering triumphs of that strange and noble country filled me with admi-

ration. Chance fixed me in a Professorship here, and I was forced by the Local Acts to be officially a Street Commissioner. What a contrast was then found by me to those works which had so instructed me in Rome, Carthage, and Holland. An undrained town in a sodden valley; a foul and filthy water-supply; and no power to obtain money to remove these evils. Still worse, there was an administrative Board unfit and unable to cope with the evil, or appreciate the risk. It would be a strange tale for those who think we are not improving, if the complacency were described with which men then lived on a site, which, we now know, needed but a chance combination to decimate it with typhoid. The town was riddled with cesspools, in the midst of which the shallow wells were dug. The Water-works pumped up, with an uncertain and infirm water-wheel, a liquid fouled by the overhanging privies and the filthy ditches of the slums of the city. There was no systematic drainage. What drains there were, were rudely executed in gaping brick. By a special engineering effort, a sewer was constructed from the north to the south of the town. When completed, it flowed the wrong way, and was abandoned. I forbear to describe the cesspools under kitchens and in entrance halls; the alleys, the houses. An upper floor in one dwelling served as a fancy dog-kennel, which I saw filtering its filth through the rotten floor on to the bed of a woman in labour in the room below. The tenement belonged to an elected, not an official, Street Commissioner. At length the Local Acts were abolished; the Imperial Acts

were adopted; a Local Board was formed; and Mr. White has shewn you the outcome in our Drainage-works to-day.

Steadily, if slowly, the Local Board is doing its work. Every year the number of those increases in the district who have mastered the sanitary problem to be worked out in this country. We have as the assiduous Chairman of our Drainage Committee one of the first scholars of the age, Dean Liddell. Many now know well that the Regulation of the surrounding flood-waters; the purification of the Thames and the Cherwell; the distribution of the sewage by irrigation; the destruction of bad courts and of cesspools; the erection of proper dwellings; all, in short, of the requirements of a healthy town, are to be steadily aimed at, and at the earliest moment secured. Yet progress cannot be always rapid. One of the wealthiest Colleges, the chief landowner of the best building-sites of the town, has felt itself compelled to allow the erection of whole rows of villas without sewers or safe water-supply. It has thereby riddled the before virgin gravel with cesspools and wells, as in the arrangements of old; and left some unhappy householders to awake from their dream of possessing perfect modern dwellings, and to find various maladies occurring, from the combination of bad workmanship with imperfect drainage. An important public functionary also laid out rows of dwellings for the poor in all but undrainable meadows.

These circumstances are alluded to because they are an illustration of what goes on in many

places, and are therefore of general interest. For we must not conceal from ourselves that the complete sanitary administration of a densely peopled state is fraught with much difficulty. Look once more at Oxford, as an illustration. It was pointed out twenty years ago that the management of every river basin as a whole is essential for the several towns on its banks. Though many riparian owners on the Thames have done much, and are spending much, Father Thames still goes his own way. He is still fouled by his neighbours; he still floods them in revenge; he still wastes his waters at his will. Would this have been tolerated in Holland, even two centuries ago? Are we to have over Dutch Engineers, as once in the days of Vermuyden, to confine him again to his banks? Will Mr. White's costly works keep the cellars of St. Ebbe's and St. Thomas's dry, or will they still leave the floods to permeate the subsoil of the lower parts of the town?

We may answer to this, that there is every hope that the Duke of Marlborough's Commission will bring to practical effect the work on which it has been now long engaged. The rate about to be levied for the Survey and other expences, will inaugurate a complete system of water regulation in the Thames valley. At all events, English engineers are ready, when they return from their Dutch engagements, to undertake our minor work here.

These circumstances, connected with the place in which you meet, have only been introduced to illustrate the subject before us:—"The Relation

of Modern Engineering to Public Health and to Local Government."

In the case of all towns, such as those comprised in the Thames valley, there is, over and above the ordinary work of town management—such as laying out streets, erecting houses on healthy models, and constructing sewers—both the draining of the surrounding districts, and securing an uncontaminated and ample water supply.

A memorial was drawn up in 1862[a], urging the Government to attend to the *Regulation* of the waters of the Thames—not to the *purification* only, but to the storeage at one time, and the liberation at the other, as afterwards recommended by the Commission of 1869. This cannot be effected without a united superintendence for the area of the whole valley. The plans of one Superintending Engineer must be followed through the whole basin, in the tributaries, as in the main channels. These plans could not be carried out without competent, well-trained local Sub-Engineers, acting nnder the Local Sanitary Authorities, and in harmony with each other.

The superintendence of wisely-devised sanitary areas for engineering purposes should be like the organization of one of our best railways, viz., into districts, or sub-districts, with connected supervision of the whole.

There are, therefore, many points to which the attention of an Association of Sanitary Engineers may be usefully drawn : a few may be named.

[a] See Note II., p. 22 ; and compare Resolutions 23 to 26 of second Report of Royal Sanitary Commission, p. 176.

An Association may help to impress on the public the detailed, as well as the comprehensive character of Sanitary Engineering, which has at length become a special and important profession, and bids fair to rival in magnitude, though we hope not in cost, the development of Railway Engineering thirty or forty years ago.

On the *details* of sanitary work it would be impertinent for me to enlarge. Yet, speaking as one of the public, I may remark that a very short time since, architects and surveyors often undertook sanitary works with very imperfect knowledge of what had been done, or of the skilled contrivances which existed. This Association will do good service, by interchanging and making public the details of their experience. Many useful contrivances, such as those made years ago by Clark of Carlisle, and many of the fittings introduced by Jennings, existed long before they were generally used. We spent much money here on bad fittings years after good ones were in the market. But this stage has passed, and we have another danger ahead — the danger of advertised and spurious wares, "floated" under many names, and processes which have not a shadow of scientific foundation. Various will suggest themselves to your minds. This is the more to be regretted, because no profession affords so many instances of valuable contrivances, either the propoundings of untaught men of genius, or the result of scientific culture by true experts. I will name three: the arrangement for dividing overflow water by the property of its velocity—applied, as I understand, first by Bate-

man in the Manchester Water-works[b]; the method of laying sewers in straight lines from man-hole to man-hole—a plan, I believe, devised by Rawlinson (whose name I cannot mention without esteem as well as respect); and the scraper for internally honeycombed iron pipes, invented by William Froude[c], the outcome of consummate knowledge and masterly powers of observation.

When we see great results produced by such simple methods, we do not despair of the sanitary arrangements in houses and cities becoming very shortly reduced to an absolute certainty, when every district has its Superintending Sanitary Engineer, versed in the best knowledge of the time, and a staff of conscientious workmen, such as our modern works are already educating.

The details are almost all known. That sanitary pioneer, Chadwick, has lately summarized the wants of the house to be weather-tight, damp-proof, miasma-proof, with warm fresh air, unwaste, fuel warming apparatus, safe water-supply and sewerage, *within;* and an Authority to remove refuse, and dispose of it with economy and safety, *without.* And so in the case of large collections of houses, i.e. Cities, Mr. Rawlinson has, in his masterly way, sketched Suggestions for Main-sewerage and Water-supply, on the principles which

[b] See the notice in the useful work of Baldwin Latham, "On Sanitary Engineering," 1874; or in "Description of Manchester Water-works, by I. F. Bateman, F.R.S., 1866."

[c] Report of British Association, 1869, p. 210. The scraper travelled successfully from the edge of Dartmoor to Torquay, being heard at its work the whole way.

most skilled borough engineers now apply. Gigantic works, indeed, are in operation or progress in every direction. Above all, the good sense and determination of the country is heartily embarked in the work.

Every place has its sanitary Authority, composed for the most part of elected residents—would they were always selected also; and every place, the Metropolis excepted, has but one Authority. We have entirely passed out of the stage of needing proof of the evil of insanitary conditions. We are in the hands of the Executive. We have to find out the cheapest form of permanent staff to carry out the instructions which accumulated Biological knowledge and experience demand. The Medical department of the Local Government Board will always have that knowledge. It is a knowledge only to be obtained by skilled experts, giving their lives to its acquisition. Like most other knowledge, when obtained, it may be handed on in a clear and intelligible form to all willing learners[d]. The advising Inspectors, and our highly instructed periodical literature, are making all such sound knowledge common property, possessed by the most intelligent persons in even remote districts.

Next, with respect to the comprehensive character of Sanitary Engineering. The Royal Sanitary

[d] See the Instructions for Medical Officers of Health by the General Board of Health, 1848; and the same of the Local Government Board, 1874; and those to Inspectors of Nuisances, and many local acts and bye-laws. See also Note I., p. 18, as to functions of Local Government Board.

Commission urged, and urged with effect, that there must be a Sanitary Authority for every spot, and but one Authority. This now is law. But it further advised that the Areas of the authorities should be re-adjusted. This is partially done, though it might have been better done. Medical officers can be appointed to areas of any size whatever, according to the conditions of the localities, and with the approval of the Central Board.

These two principles—the having even every hamlet under proper sanitary care; and the power of combining areas into the most suitable dimensions, according to the population, and the physical conditions of the districts—lie at the root of the whole question of national sanitary arrangements.

But we may see at a glance that these principles touch not only the details of local taxation and administration, but the mode of imperial supervision of any national funds given in aid of local sanitary work.

It is greatly to be regretted that popular writers do not always note this. They often blame Government for not settling by a stroke of the pen what touches every local interest and property in the country. So large a question has unavoidably baffled, as yet, every statesman who has approached the subject; but every Session of Parliament throws light upon it, and brings us nearer to a solution. For my own part, I retain the conviction of many years, that the true policy for securing the national health, lies in the steady education of the people, to take a thorough and

intelligent interest in perfecting, under local management and central or imperial advice and supervision, their local sanitary arrangements[e]. I am more convinced than ever, that coercion, even if attempted, will in the end retard progress. Theorists may dislike the political truth, that in this country neither the Government, nor the people, separately from each other, direct public opinion, or make public law: it is discussion, and action and re-action, between the two, which bring about among us stable progress. Practical life in England does not rest on logical science.

The profession of Engineering is one which above all others has been self-made, without the trammels of regulations. This has been at once a source of strength on the practical side, and of danger on the scientific. But without pursuing that subject, it must be admitted that the sanitary engineers of the future will need as much consideration in a perfect sanitary organization, as the legal or the medical department. It will be for the engineering profession itself to see to the training of its students, the due supply of its ranks, and the guarantee for the fitness of its members.

The public grievously need some guarantee. Health authorities have often been put in difficulty to know in whom they can place their trust, whether they seek for knowledge to guide them, or high character to keep down expenditure.

History has shewn that much bad work has been heretofore done, either from lack of training or want of experience. Much money, too, has been

[e] See Note I., p. 18, as to functions of Local Government Board.

squandered, because the interest of the employer has not always been the first object in the execution of works. There are many remarks worthy of attention on this subject in the writings and autobiography of Sir John Rennie. But, this being said, it is right to add, that probably there never was a time when it was as easy as now to obtain competent and upright men for the superintendence of sanitary work.

It will go far to reconcile England to a thorough redistribution of areas for purposes of Local Government, and the establishment of a complete executive for the objects of preventive medicine, if the people are convinced that no works are advised which are not really needed, and that none are taken in hand which are not faithfully executed in respect of durable workmanship, and carefully controlled in respect of cost.

For this end, as in other departments, but two things are necessary: the average knowledge and good sense of the practical men of a district for all local purposes, with highly-skilled imperial inspectors occasionally to advise and assist. The germs of this system we already have, in both the medical and engineering departments. A few years more, and we may hope to see the full harvest of our experience gathered in, and a thickly-peopled country for the first time parcelled out into areas, where all that can be done for health is done, and nothing done which is needless or fantastic.

Lastly, in a memorandum in the Report of the Royal Sanitary Commission, the "National or Chief

Health Office," or the "Local Government Board," is said to be divided into six departments :—

1. Legal.
2. Engineering.
3. Statistical.
4. Poor-Relief.
5. Medical.
6. Medical Legislation.

In the Public Health Act of 1875, by far the greater number of clauses are necessarily devoted to subjects purely legal. Comparatively few are needed for the direction of the constituted Authorities in respect of the Medical Officer of Health, or of the Engineering Officer of Health. Every Authority is obliged to appoint both, as well as an Inspector of Nuisances; but either of the two chief officers may act in the last capacity also.

The Engineering Officer or Surveyor has a very onerous duty. He has to execute and maintain what the science of medicine suggests as desirable to be attempted, to enforce and maintain cleanliness, and to provide pure air, pure water, dry and pure dwellings. All this is to be done, as far as the conditions of our climate and nation permit, for every site in the city; from the crowded alley to the palace; for every cottage on the hill-side, and for the princely, but often dangerous, dwelling, an English country-seat.

There is a great future for the Sanitary Engineer in this country. The Institution of Engineers proudly boasts, that it aims at "directing the great sources of powers in nature for the use and convenience of man." Well have the British engineers striven to this end. They have invented count-

less machines for useful and countless ends[f]; have constructed all over the world railways and bridges, opening up unknown and before unattainable regions; have built light-houses, and docks, and ships, with scarce a rival; and lastly, they have begun a yet more useful work, more necessary, more blessed, soon we hope to be one more gem in their professional crown, — they have entered on the search after the most economical means for providing a healthy home for every man, rich or poor, according to his wants, his place, and his condition; and thus, hand in hand with the longed-for progress of education, morality, and culture, they will make possible a virtuous and happy fireside for crowded and toiling millions.

[f] See the Preface to the first volume of Smiles' "British Engineers," a book which those who are inclined to despair of England had better read.

NOTES.

I.

THE following Extracts from the Memorandum printed in the Report of the Royal Sanitary Commission, tending to illustrate some of the functions of the Central Office, may not be out of place here. They are found in full also in "National Health," by Dr. Acland, (James Parker and Co., London, 1871, Second Edition) :—

§ 1. The duties of the medical officers of public health must necessarily be considered in connexion with several complex questions of central and of local administration.

The Commission has unanimously come to the conclusion that every question affecting public health should be brought into relation with one central office, presided over by a minister. Every health officer would thus stand directly or indirectly in official relation to such a minister.

§ 2. It has been further decided that every district, urban, suburban, or rural, should, in respect of its public health, be as closely connected with the said department of health as is every part of the country with the Home Office through the police and the magistrates, and as are the destitute with the Poor-Law Board through the guardians of the district in which they are resident.

In short, that every person shall henceforward be entitled to such reasonable public protection in respect of his health as he is in respect of his liberty and his property. For instance, he shall no more be liable to have the water of his well poisoned by the neglect of his neighbour, than to be robbed with impunity.

And he is to be under this protection, as far as it is reasonably attainable, everywhere and at all times.

The *first* principle, therefore, of sanitary administration is that no member of the community shall wilfully or for profit damage another man's supply of the three absolute essentials of life, food, water, and air ; and therefore that it is the duty of the State to secure, as far as possible, that these essentials shall be supplied, in sufficient quantity, and the greatest attainable purity, in all circumstances in which these objects cannot be attained by individual care and resources. In this point of view it may appear a question whether the State should allow that any man, even by prescription, shall be held to have acquired the right

to pollute, for his own advantage, another man's food, water, or air, or in any manner poison him. At any rate, care should be taken that no one shall acquire such right in future.

The *second* requirement of sanitary administration is universality, through constant supervision by public health officers in every part of the country.

The efficiency of the agents in sanitary administration is as important as their ubiquity.

They must be well-instructed and capable, without the pedantry or officiousness of sciolists. Ignorance, pretentiousness, or over-meddling on the part of the agents would bring into disrepute any sanitary system. In a free country disrepute would bring about failure. Fitness in the agents is the *third* requisite in sanitary legislation.

Though an all-pervading system of sanitary experts be thus necessary for a densely-peopled community, living in artificial or non-natural conditions singularly unfavourable to health, yet the very exigencies of such a community make it unlikely that in this country any costly system of sanitary inspection can be established at present; any proposed system must therefore be economical. Though at present the State must spend great sums on experimental armaments and weapons of destruction, it may hesitate to make costly experiments for the prevention of possible or contingent sources of ill-health. Those who are strong doubt the necessity, those who are sick—happily the minority—have not power sufficient to promote great schemes. Economy is therefore the *fourth* essential principle of Sanitary Administration. . . . .

* * * * * *

It must be remembered that the inspectors who will be responsible for local sanitary administration have collectively, if not individually, to administer Acts[a] bearing on the following subjects:—

§ 10. 1. Plans bearing on sanitary engineering or on local government, i.e. drainage, sewerage, water supply, baths and washhouses, nuisances, offensive trades, smoke, public places of recreation, streets and roads, buildings, cellars, and lodgings, burial-grounds, mortuaries, appointment of officers, artisans' dwellings, labourers' dwellings.

[a] See Glen on Public Health and Local Government Laws, and Baker on Laws relating to Public Health.

2. Care of personal health and safety, i.e. health in factories and workshops, mines, bake-houses, dangerous occupations.
3. Regulation of quality of food, i.e. adulterations, markets, diseased cattle, slaughter-houses.
4. Medical, i.e. prevention of disease, epidemics, endemics, syphilitic disease, small-pox (vaccination), quarantine, lunacy, hospitals [b], whether, first, rate supported, such as workhouse hospitals, or hospitals under local boards; or secondly, voluntary, whether general or special, endowed or subscriptional, county or small village hospitals, or hospitals for the insane, and prisons, sale and adulteration of drugs, poisons, supervision of reports of officers of health.
5. To which must be added medico-legal arbitrations. . . . .

* * * * * *

There should be—

I. A Minister of Health and Local Government.

II. Six (Five, 1876) permanent departments under the Minister, for—

a. Law of local government.
b. Engineering.
c. Registration and statistics.
d. Relief of poor.
e. Medical care of public health and poor.
f. Legislation bearing on the profession of medicine [c].

III. A body of inspectors attached to the Health Office. These are to be of two kinds, as at present, with a third body of consulting experts.

1st. General inspectors attached to, and generally residing in the "registration divisions," "poor-law districts," or (as they will also be) "public health areas."

2nd. Special inspectors, viz. legal, engineering, scientific, and medical.

3rd. Special experts whose names should be attached to the Office, and who should advise professionally on special points for special fees, such persons to be appointed for five years and re-eligible.

4th. There will be required local clerks of unions, and of town

[b] The whole question of the grounds of admission into rate-supported hospitals must be reconsidered by the Legislature. In Ireland the best results have ensued from the admission on payment of any persons suffering from fevers or severe accidents.

[c] This should remain with the Privy Council.—(H. A., 1876.)

councils, local surveyors under local boards and unions, local public health (medical) officers of local boards, unions, parishes, subordinate executive officers. . . .

All reports bearing on public health will be connected one with the other, mutually illustrating each other. They will cover the whole ground of the science of prevention of disease, which has become both so important and serious for the well-being of old and densely-peopled countries. The connection of the office of the Minister of Health with the medical profession, 4,000 members of which would be in direct relation to him, would in itself be beneficial to the whole country. It would disseminate established scientific knowledge uniformly through the country districts, affecting not the medical man only, but the clergy and the schools, doing in that way alone as much at least as direct legislation for the same purpose could do. It would bring to light in every corner all that could be advanced as bearing on the physical condition of the masses of the people, while all crude theories or impracticable plans would instantly fade before the experience of the Central Office.

The publications of the statistical department would exhi bit what could be shewn of the progress of sickness. They mig ht give also useful deductions from local meteorological and scientific observations, in connection with those of Kew, the Government Meteorological Office, the Meteorological Society of Scotland, and other sources. . . . .

Great encouragement should be given to local public health officers to send in any observations which would promote the progress of accurate knowledge.

The British Public Health Reports thus constructed, printed in an uniform 8vo. form, stitched in a plain distinctive wrapper, and issued in five parts, (legal, statistical, engineering, medical (including medico-legal), and general papers of inspectors,) would be a series of great value. The Central Office should immediately on the first issue of the collected series, make arrangement for regular interchange with all foreign countries of similar reports, according to the established usages of academies. These documents should be accessible for reference in the public health library of the minister to all persons connected with the department.

Public Health laboratories should be maintained or aided by grants from time to time. In them not only points bearing on the general pathology of man and animals, would be from time

to time investigated under the best guidance, but persons would be trained to be thoroughly qualified in all medico-legal questions. Hereby some of the scandal of ex-parte scientific witnesses might be checked or removed. Such laboratories should be aided or maintained as well in the metropolis as in some of the great towns where scientific institutions and medical schools exist, e.g. Oxford, Cambridge, Birmingham, Leeds, Newcastle, Bristol. These centres are conveniently situated for various sections of the kingdom . . . .

* * * * * *

Doubt has sometimes been expressed whether the ordinary medical practitioner is sufficiently instructed in preventive medicine. Such doubt would soon prove unfounded, if the organisation we propose were adopted. The medical officers under the Poor-Law are perfectly able to fill up returns, make reports when called upon, point out cause of ill-health, and superintend such remedies as the central authority may suggest or direct. No ordinary medical officers should be expected to discharge the duties of the police, the lawyer, or the engineer. . . . .

* * * * * *

II.

Memorial concerning the Regulation and Purification of the Thames Waters.

1. *Whereas* the Area of the Thames and its Tributaries may be computed to contain 6,000 square miles, and extends over parts of the several Counties of Essex, Kent, Middlesex, Surrey, Hants, Berks, Wilts, Oxon, Bucks, Herts, Warwick, Northampton, and Bedford,

2. *Whereas* it is highly expedient to regulate the waters brought down by the River Thames, so that they shall be as fit for use and as little contaminated as may be, both in the district immediately above London and in the neighbourhood of all towns on its banks,

3. *Whereas* no systematic provision has as yet been made either for regulating the several branches of the waters in the Thames Basin on a common plan, or for deterring the Towns on the several parts of it from casting their sewage into the streams ; and *whereas* many Towns situated above the Metropolis, viz., Richmond, Staines, Windsor, Maidenhead, Henley, Reading, and Oxford do so cast in the whole or parts of their sewage,

4. *Whereas* it is admitted that besides the injurious pollution of the waters, waste accrues from the loss of sewage,

5. *Whereas* the unregulated action of floods inflicts damage on many lands adjoining the River, and is injurious to the Health of the District,

6. *Whereas* it is certain that these evils would be greatly abated, and the Public Health improved by a more complete and systematized management of outfalls, dams, and sewers than is at present possible,

7. *Whereas* also a Report on the Thames Basin with reference to these several particulars would establish principles applicable to other River systems, and besides improving the water supply of the Metropolis, would yield much information bearing upon the Public Health, and of service to the Nation at large, and may properly be therefore esteemed a National object,

THE UNDERSIGNED solicit the GOVERNMENT to issue a COMMISSION OF INQUIRY, or to cause full inquiry to be made in such way as they may see fit, into the condition of the Thames and its Tributaries (the immediate district of the Metropolis being excepted from such inquiry, as already under special jurisdiction); to INQUIRE what defects exist; and to REPORT what remedies can be applied to such defects; having regard generally to all purposes by which the River and its branches, or lands adjoining to them, may be improved; but specially to the purification of the Thames waters for the use of the Metropolis and of the Towns in the Thames district, as well as the amendment of the Health of the Population which adjoins them.

(*Signed*)

EDWARD SABINE,	President of the Royal Society.
RODERICK MURCHISON,	Director-General of the Geological Survey.
RICHARD OWEN.	
C. B. ADDERLEY.	
WILLIAM HEATHCOTE, M.P.	
GEORGE GRAHAM,	Registrar-General.
WILLIAM FARR,	Somerset House.
THOMAS WATSON,	President of the Royal College of Physicians.
NEIL ARNOTT, M.D.	
WILLIAM A. GUY,	King's College.
R. DUNDAS THOMSON, F.R.S.,	Health Officer, Marylebone District.
JAMES CLARK.	
ROBERT RAWLINSON, C.E.,	Local Government Office.
STRZELECKI.	
CARNARVON.	
S. OXON.	
J. RANDALL,	Archdeacon of BERKS.

FRANCIS JEUNE,	Vice-Chancellor of OXFORD.
HENRY G. LIDDELL,	Dean of Ch. Ch.
HENRY W. ACLAND,	Regius Professor of Medicine.
JOHN PHILLIPS,	Professor of Geology.
B. C. BRODIE,	Professor of Chemistry.

And others.

May 28, 1862.

The invaluable Reports of the last fifteen years from the several Committees and Commissions, on Sewerage, Pollution of Rivers, the River Thames, and Water-supply, more than justify every clause of this Memorial.

Printed by James Parker and Co., Crown Yard, Oxford.